Mh 10
70

MINING LEGISLATION.

A PAPER READ AT THE

GENERAL MEETING OF THE AMERICAN SOCIAL SCIENCE ASSOCIATION AT PHILADELPHIA, OCTOBER 25, 1870.

By ECKLEY B. COXE.

Collins, Printer, 705 Jayne Street.

Copies of this paper can be obtained by applying to Mr. J. G. Rosengarten, *Secretary of the Philadelphia Branch of the American Social Science Association,* 532 *Walnut Street.*

MINING LEGISLATION.

A PAPER READ AT THE GENERAL MEETING OF THE AMERICAN SOCIAL SCIENCE ASSOCIATION, AT PHILADELPHIA, OCTOBER 25, 1870.

Of late years the attention not only of our national and State legislatures, but also of the public at large, has been directed to the necessity of proper legislation in reference to mining, and to the true relations of government to that industry and to the workmen employed in its prosecution.

Although little has as yet been said or written upon this subject in the United States, it has been carefully and scientifically studied for hundreds of years in Europe, and, during the present century, the mining codes of the principal countries of the Old World have been greatly modified and improved. England, France, and Germany have their mining laws and their corps of mining engineers or inspectors, but in this country, until very recently, we have had no legislation in reference to mining, and, of course, no official supervision of the miners and of the mines. During the last ten years several very terrible accidents have occurred in different countries, by which the importance of legislation for the better protection of miners has been made evident to the civilized world. Among the most horrible were the disasters at the Hartley and Oaks Collieries in England, that at the Potschappel mines in Saxony, and that at the Avondale shaft near Wilkes-Barre in Pennsylvania.

The accident at the Hartley Colliery occurred on the 16th

of January, 1862, and was caused by the breaking of the beam of the pumping engine, one-half of which, weighing many tons, was precipitated into the shaft, carrying with it in its fall the timbers, brattice, etc., and completely closing the pit some distance above the bottom. As there was but one outlet, the air in the workings soon became impure, and all those in the mine at the time, two hundred and four in number, perished by suffocation. This horrible accident caused a change to be made in the mining laws of England, no mines with a single outlet being now permitted. The Oaks Colliery disaster, by which three hundred and sixty two persons, perhaps the most ever killed at one time in a mine, lost their lives, was occasioned by an explosion of fire damp, and occurred on the 12th of December, 1866. The accident at the Saxon mines took place on the 2d of August, 1869, in consequence, as it is supposed, of the fire damp penetrating into some old abandoned workings, in which the coal had taken fire by spontaneous combustion; an explosion ensued by which two hundred and seventy-six workmen perished. The news of this accident was received with a shudder by the whole civilized world, and, but a few weeks afterwards, we in Pennsylvania were shocked by the report, that one equally horrible had occurred in our midst. The Avondale disaster happened on the 6th of September, 1869. The shaft, which was the only outlet, was divided, for the purposes of ventilation, by a wooden partition into two parts. The latter caught fire from the furnace used to produce the current of air in the mines, and the flames were communicated to the breaker, a large building also of wood, placed directly over the mouth of the pit. When the partition in the latter was destroyed, the air could no longer enter the mine, and the men, to the number of one hundred and eight, died of suffocation.

A point to which we would here call attention, and to

which we will have occasion to refer in another part of this paper, is the great difference in the mining legislation of the three countries in which the above-mentioned calamities occurred. England, the scene of the first two accidents, was at the time supposed to have a very good mining law, and all her coal mines were under the direction of a corps of able inspectors, whose duty it was to see that the provisions of the mining act were carried into effect. Saxony, where the third accident occurred, has been for centuries one of the great mining districts of Europe, and her mining laws are the result of long and varied experience. Her corps of mining engineers stands second to none in education, ability, and reputation, and her school of mines has no superior and very few equals. Pennsylvania, when the Avondale disaster occurred, had no mining law and no inspectors of mines, and very few people in that State had ever thought either of them to be necessary. During the excitement caused by this accident, the State legislature passed, in haste and without proper study of the question, an act, which is both defective and incomplete. It is known as the "*Ventilation Act.*" This, with the exception of some laws in reference to the titles to mining claims on government lands, passed by Congress, is the only legislation I know of upon this subject, which has been enacted in the United States.

Before considering what is required in this country, let us examine the mining legislation of Europe, beginning with the continental codes. On the continent the state is the owner of all ores, coals, and minerals, and of the right to mine them. There are a few exceptions in regard to some kinds of iron ore, and to substances which are quarried and not mined; they are the property of the land-owner. The laws of the various mining codes may be classed under three heads, viz: those relating to the granting or conceding of mines, to titles to mines, etc.; those relating to the health and safety of the

miner and of the mine; those relating to mines as sources of national wealth, which are to be used but not abused. As the title to all mines is originally in the state, and as they are generally worked by private individuals or companies, it is necessary that the mining code shall fix the terms upon which the right to mine may be acquired. The government should, of course, always endeavor to encourage the search for and the opening of new mines upon all land not already occupied. A new mine is a source of new wealth to the country. The laws vary in the different states, but the right to explore is generally granted first. After an ore or mineral has been found to exist in sufficient quantities to justify the opening of a new mine, the right to work it is conveyed under certain conditions to the applicant for it, and from that time he has the exclusive right to mine that mineral in the territory assigned to him. For the privileges granted to him he pays either so much per unit of surface at once or per year, and also a certain percentage of the net profits, or of the ore or metal extracted from the mine. It is generally stipulated that a certain amount of work shall be done every year, or the title returns to the government. Under some circumstances, *e. g.*, in case of war, this condition may be remitted. In former times, mines were taxed very heavily, and governments endeavored to obtain as much direct revenue as possible from them; but at the present day the conditions imposed upon and the royalty paid by them are generally made as light as possible, the state relying more upon the indirect than upon the direct profit of this industry. It now seeks rather to assist than to discourage those engaged in that business, which is so often but a lottery.

We will not discuss this branch of mining legislation, as it is of less interest to us who live in the older states, where the title to minerals (with the exception of reservations, in some

cases, of a part of the gold and silver) is in the owner of the soil.

Let us now consider the laws which may be classed under the second head, viz., those which provide for the safety and health of the miner, and for the protection of life and property on the surface from dangers arising from the caving in of the mines, or other similar accidents. Although this portion of my subject is the most important, I approach it with some diffidence, as I am personally interested in working mines, and belong to that class from whom the mining law is supposed to protect the miner. I feel, therefore, that my views may not be so unbiassed as I should wish.

Let us now consider what are the perils to which a miner is exposed, and what are the best means of protecting him from them. There are two classes of mines, those in which no fire-damp is found, and those in which it is given off or generated. There are two kinds of dangers to which a miner may be exposed, and from which it is the province of mining legislation to protect him, viz., those which may result in death or mutilation, and those which may injure the constitution of the workman and produce disease. In mines where fire-damp occurs, those engaged in them incur the additional risk of being burnt or killed by a sudden explosion of that gas.

What are known as accidents in mines may result from the ignorance or carelessness of those in charge of the management of the mine, from the ignorance or carelessness of the miners themselves, or from causes which neither could reasonably be expected to foresee. From the account given at the beginning of this paper of the four most terrible mining disasters of the last ten years, we see that those countries possessing the most perfect mining codes and the ablest mining engineers, and in which mining has been for centuries one of the regular industries of the land, are never

completely protected from such disasters, particularly where that great enemy of the miner, "*fire-damp*," is found. The inference to be drawn is not, however, that a mining code and able mining engineers are of little or no use, but, on the contrary, that it is of the utmost importance to be ever on the watch to amend and improve the laws, and to instruct those in charge of the works in all the improvements made in their profession.

A miner may be injured either while at work, or when going to or returning from it. The dangers to which he is exposed while passing from the mouth of the mine to the place where his work is to be performed and back, and over which he has no control, may be occasioned by the failure of the ropes, ladders, cages, or man-engines; by defects in the hoisting machinery; by falling pieces of wood, coal, or rock; by holes or pits left uncovered or imperfectly fenced off; or by the smallness of the gangways, shafts, or levels, where he is obliged to pass cars or buckets in motion. Here the miner can do but little for his own safety, and must, therefore, rely upon those in charge of the mine and machinery, and upon the laws enacted for his protection. The latter should require the ladders to be safe, to have the proper form and slope, to be provided with resting places at the proper distances apart; the ropes to be carefully tested, to be of the proper size and strength; the cages, when used to carry men, to be provided with parachutes, and the man-engine, when it is adopted, to be well constructed. When men are obliged to travel in shafts, slopes, gangways, or air-passages, in which they are liable to meet cars or buckets in motion, places of refuge should be provided, so that they can pass them without danger.

But there is another class of accidents, which occur even when all reasonable precautions have been taken. They are those occasioned by the thoughtlessness, imprudence, and

foolhardiness of the workmen. Some men, when accustomed to climb ladders, do it almost mechanically, and are very apt to have their thoughts elsewhere when moving in dangerous places, and, while in a sort of brown study, will step off ladders or platforms and be dashed to pieces. Others again are so anxious to show how much stronger, braver, or more active they are than their fellows, that they will constantly put themselves in unnecessary peril by climbing where they ought not to. There is also a class of workmen who are naturally careless, and who will always be leaning over the side of the cage, putting their heads or arms out, etc., forgetting that they may at any moment be killed or maimed by a projecting rock or timber. Accidents of this kind cannot be prevented by legislation; it is only by raising the standard of education among the miners, by instructing the boys, and by providing schools for master miners, that their number can be diminished. We will not discuss here the precautions to be taken in entering old abandoned mines, although the mining law should specify them. This point, though of but little importance in this country at present, will become one of great interest when mining has been carried on for a long time. We now come to the consideration of the dangers to which miners are exposed while at work. They may result from any one of the three classes of causes previously mentioned, viz., their own carelessness; that of the persons in charge of the mine; causes which could not reasonably be foreseen by either miner or master. A miner may be injured by a falling piece of rock, coal, or timber, by want of proper care in the use or preparation of the tools and materials employed by him, by want of proper ventilation, or by fire in the mines.

If the place where the miner is working is not properly timbered, the entire roof may fall, crushing all who are under it. Such an accident rarely occurs, as the miner generally has notice in time, the rocks when parting producing a loud

cracking sound. The greater number of such accidents are occasioned by the sudden breaking loose of comparatively small pieces of rock or coal, which, if they happen to fall upon the miner, are very likely to produce serious injury. Almost all the labor performed in mines is necessarily done by contract, as every one works more or less alone, and it would, therefore, be almost impossible to exercise a proper surveillance if the workmen were paid by the day. The miner, as he receives remuneration only for what he produces, will often run a great risk rather than do a little work for which he will receive no direct compensation. He has tried it so often without being hurt, that, although perfectly aware of the danger, he imagines he will escape this time without injury. This feeling leads him to undermine more than is safe, in order to bring down more stuff with his next shot and thus economize his powder, to avoid standing props where they should be used, etc. This is one of the most frequent causes of injury to miners, particularly when they are not very skilful. The mining laws of Europe require the timbering to be properly attended to in all cases, and it is the duty of the inspectors to examine all mines to see that the proper precautions have been taken in this respect. A miner, who does not obey the instructions given him in regard to timbering the place where he is working, is punished by the law, even where no one but himself is endangered by his neglect. The miner, when ignorant or unskilful, may injure himself with his tools or by handling his powder carelessly; but the law should require the materials and implements furnished by the mine to the hands to be of the best quality.

Accidents often happen in consequence of the powder taking fire too quickly when a blast is about to be set off; the miner may misjudge the length of the fuse; may fire the cartridge while tamping the hole; may suppose the fuse to be extinguished, and go back to light it again, only to be caught

by the explosion. Sometimes, when a hole has missed fire, the miner attempts to bore it out so as to put in a new fuse; this is very dangerous, and should never be permitted. The mining codes of Europe contain very stringent provisions in reference to blasting and the use of powder or other explosive substances; the tamping bars and needles must be made of copper, and the boring out of holes which have missed fire is positively forbidden. Legislation can do something to prevent this class of accidents, but much will of course depend upon the intelligence and care of the miner.

The next class of precautions to be taken to protect the miner may be considered under the head of "*ventilation*," and here legislation and proper inspection of the mines can do much to prevent disaster. Miners may contract fatal diseases by working for several weeks or months in impure air, *i. e.*, in air containing too much carbonic acid gas, or too little oxygen, or he may be suddenly suffocated under the same circumstances. The most terrible of all the dangers to which the miner is exposed is that occasioned by the presence of fire damp in the mines. He may also be killed by the irruption of foul air from old workings. Two of the most horrible of disasters, cited at the beginning of this paper, viz., those of the Avondale and Hartley collieries, were caused by the cutting off the supply of fresh air, those inside perishing by gradual suffocation.

We have now mentioned the principal causes of what are generally termed accidents in mines; but there is another class of dangers which, although seldom referred to, often occasion the loss of more years of life than any of those cited in the foregoing pages. The health of the miner is seriously impaired, and his life often much shortened, by exposure to wet and cold, or to sudden changes of temperature, by working in air which, although capable of supporting combustion, is too impure to be breathed for a long time with impunity,

by inhaling gritty particles and lamp-smoke into his lungs, and, finally, by climbing up and down ladders in going to and from his work. When a workman is obliged to ascend and descend several hundred feet in this way every day, the effect upon his general health is soon very marked, and is most pernicious. The men climb up (or down) one after the other, each with a lighted lamp in his hat or hand; now as this severe exertion causes violent respiration, they inhale into their lungs large quantities of the lamp-smoke: this is one of the principal causes of *black* or miner's consumption. Upon arriving at the top or bottom, they are generally tired and heated, and consequently stop to rest, and thereby become chilled. The danger from these causes of disease is greatest in metal mines, which are commonly supposed to be much safer than coal mines, and their effects are so pernicious that the average duration of the life of the metal miner, where the shafts are deep, is generally much less than that of the collier, who is exposed to the additional danger of explosions of fire damp. In coal mines where the latter is met with, the ventilation must be very perfect in order to keep them safe, and the miner works always in very pure air. It is also much cheaper to drive airways in coal than in rock. The great supply of pure air and the fact that the miner is generally let down and drawn up the shaft by machinery add many years to his life.

Although legislation can do and has done much to protect the miner from these causes of disease, yet it is also very necessary that he should receive instruction as to the proper precautions to be taken for the preservation of his health. In Europe all mines infested with explosive gases are subjected to very strict regulations as to ventilation, and the inspectors are required to examine them constantly. This portion of the mining code should be drawn up with the greatest care.

The laws which may be classed under the third head, *i. e.*, those relating to mines as a source of national wealth, are to be found only in the codes of continental Europe. Every operator is there allowed to work his mine up to its full capacity, but he is not permitted to do so in such a way as to compromise the safety of the mine, or to destroy or render useless any ore or mineral in the deposit. This is often done; in this country, alas, it is the rule rather than the exception. Very often the richest ore only is taken out, and thousands of tons of poorer stuff, which may never again be reached, are left behind. Sometimes, in order to save expense, the timbering is made too light, and much good ore is lost by the caving in of the mine. In Europe it is the duty of the government engineers to see that no such wanton waste occurs, and to stop the mine, if that be necessary, to prevent it.

Let us now consider what should be done in this country, confining our remarks to the older states, where the general government has no interest in the land, and where the laws must be enacted by the state legislatures. We need not consider the question of the title to mines, that belonging to the province of the lawyer, as the minerals go with the surface right. We will devote our attention more particularly to the laws which may be classed under the second head. In all countries where the right to mine must be obtained from the state, the latter can impose any conditions upon the operator which it sees fit; for they are really only the terms of the lease under which the mines are worked, and the parties undertaking to open them are perfectly aware of what will be required of them before they expend any money. In this country, as in England, the government can only interfere where it is necessary to do so in order to protect the life or property of the citizen. Mining is no way different in the eyes of the law from any other industry. Although the state is bound to see that the miner is subjected to no unnecessary

danger, yet it is equally its duty to protect the workmen in powder mills, the hands in factories, the passengers upon railroads, and the citizen in his home when his life is placed in jeopardy by the erection of unsafe steam boilers near his dwelling. The duty and the right of the government to interfere in all the above cases are based upon the same principles. Although there is a great and pressing need of a good, well-digested code of mining laws in this country, the method adopted at the last session of the legislature to obtain it is not, I think, the most advisable.

The subject of mining legislation is not a new one; able experts in England, France, and Germany have been studying it for many years, and it is very important for us to profit by the results of their labors. In preparing a mining law it would not be wise, I think, to base it, as has been done, upon the assumption that one class of persons to be affected by it, I mean the operators, are not to be consulted, the law being intended merely to protect the workmen from them.

In drawing up the act, three parties are to be considered: the miner, the mine owner, and the general public. The first and main object of such legislation is, of course, the safety of the miner, and to this all other considerations must yield, but at the same time, care should be taken to impose no useless restrictions upon the operators, to make the law as simple as possible, and to frame it in such a way as to prevent any feeling among those affected by its provisions, that their interests have been uselessly sacrificed.

A mining law should, if possible, be satisfactory to both workman and operator, who should feel that there was no intention to oppress either, otherwise the law will be obeyed with great reluctance; it should contain no illegal provisions, which, if contested, would be overruled by a court of justice. It is important to the whole country that the mines should be required to make no useless expenditures, as this will cause an increase in the cost of production of the mineral,

that may seriously affect those industries which are dependent upon the mines for their supplies. All such expenditures fall eventually upon the consumer, and, if uselessly made through ignorance, are a national loss of labor or capital.

If a good mining code is to be enacted in any State, a commission or committee should be appointed to frame it, which should consist of, or at least have the advice of, one or more persons learned in the law, of one or more persons skilled in mining and well-acquainted with the mining legislation of Europe, of one or more practical miners, who are familiar with the dangers to which they and their fellows are exposed and who would represent those to be protected, and finally of one or more persons interested as operators or owners of mines.

In drawing up the law, it is important that no provision should be inserted which would be declared unconstitutional by the courts. If any clause in the act were decided to be illegal, parties would be encouraged to contest some of the other provisions, and much time would be lost before it could be brought into regular operation. It would be the duty of the mining engineers to examine the mining codes of Europe, to collate all that had been done previously, and to furnish to the committee the scientific groundwork of the act. They could also give advice if a dispute arose between the representatives of the workmen and of the operators. The practical miners would call the attention of the committee to the dangers to which they were particularly exposed in the state or country in question. Each mining district has its own peculiar sources of peril, in one it is the fire-damp, in another the water, in a third the bad roof, in a fourth the great thickness of the vein, etc. These points should be carefully considered, and a man, who is daily exposed to such dangers, could afford much assistance to the committee in their work. The owners and operators of mines, who, as in Pennsylvania, have

invested hundreds of millions of dollars in purchasing, opening, and improving their properties, and in building railroads for the transportation of the products of their works, should also be heard, not for the purpose of thwarting any legislation which might be necessary for the safety of the men, but to prevent the insertion of useless or oppressive provisions in the law, like some of those to be found in the act lately passed by our legislature. If all parties were heard before the bill passed finally, the law would be obeyed much more cheerfully both in letter and spirit.

No matter how well digested the provisions of the act may be, it will always be difficult to carry them into effect, unless the persons charged with the duty of inspecting the mines are well-educated, experienced, and honest mining engineers or viewers. Such officers can only be obtained by establishing good schools for civil and mining engineering. The appointments should be made by competitive examination, those showing most theoretical and practical knowledge to be chosen. There should be different grades of inspectors, so that faithful service would certainly be rewarded by promotion. All appointments should be for life or good behavior.

It is also important to provide schools for the education of working miners, in which they could be fitted for the responsible post of mine boss, as the overman or master miner is called in this country. The course of instruction should be so arranged that the miner could, while pursuing his studies, support himself by working in the mines. He would not, of course, be able to gain as much as those not attending the school, but he could earn enough to pay his expenses. For this reason the schools for master miners should be located in the mining districts, where work could be obtained. The course of instruction should embrace the elements of geology, chemistry, and mechanics, with special instruction in mining and underground surveying. Such schools exist in many

parts of Europe, and have been found to be eminently useful. Although I am not aware that the plan has ever been tried, I think that much good could be done by introducing into the common schools of the mining districts an elementary course of instruction upon the subject of mining, with special reference to the health and safety of the miner. If such provisions for the instruction of all classes of persons employed about the mines were made, one of the greatest difficulties in framing and carrying out good legislation upon mining would be removed. It is important that there should be some person or board to whom appeal could be made, when disputes arise between the local inspector and the operator, and who would have the power of suspending some of the provisions of the act, or of imposing temporary restrictions upon the mines, in cases of emergency. This could be arranged by having several grades of inspectors. At present the inspector in Pennsylvania stands alone; there is no one to whom he can appeal in case of doubt, and no one whom the operator can call in if he thinks the inspector is wrong. The operator can now appeal only to a court of justice. In Europe the case is different; in England an appeal can be made to the Secretary of State, who appoints a commission to investigate the subject; on the Continent the same thing is done by the higher mining officials.

It is of the very greatest importance that the men should be obliged by law to obey the orders given them in regard to mining, timbering, use of lamp, etc., by those placed over them. No law and no care of the inspectors will be of much avail if the men are at liberty to disobey the instructions given them in regard to their work, the use of their lamp, or the precautions to be taken to avoid accidents. In all the mining codes of Europe there is a provision compelling the directors of mines to adopt rules for the management of the works, and these, when approved of by the inspector,

become part of the mining law, and every one employed about the mines is obliged to obey them. Unfortunately there is no such clause in the law lately adopted in Pennsylvania. Many persons have an erroneous impression that mining is a peculiar subject for legislation. In those countries where the right to mine must be obtained from the government, the latter can, of course, impose much greater restrictions upon mining than upon other industries. In this country, on the contrary, the right to mine belongs to the proprietor of the surface, and the state can only interfere when the lives or property of others are endangered, and it is then its duty to do so. The case is, however, the same with railroads and powder-mills. If it is the duty of the government, before allowing one citizen to employ men in his mine, to see that proper precautions have been taken to protect the miner not only while at work, but also in going to and returning from it, so long as he is underground, it is certainly also the duty of the state to see that the hands in factories are equally well taken care of, that they are exposed to no unhealthy atmosphere or danger of being injured by the machinery, and that the lives of passengers on railroads are not placed in jeopardy by unskilful engineering, by false economy in the purchase of bad rails and inferior rolling stock, and by neglecting to introduce all improvements which add to the safety of railroad travelling. The same is true of steam-boilers, when they are erected in populous districts. These matters are all placed under the surveillance of government engineers on the Continent of Europe. Human life is of equal value everywhere, and what is wanted is not simply a good mining law, but a well-educated corps of experts acting under a well-digested code, whose duty it should be to inspect all mines, manufactories, steam-boilers, and railroads, and to see that the proper precautions have in all cases been taken for the safety of life and property. Although thou-

sands of persons have lost their lives in mines in the last twenty years, yet the number of those who have been killed and injured upon railroads or other public works is much greater. One general law could be made to comprehend all the above cases, and one corps of engineers could see that its provisions were carried out. One of the most important functions of such a corps would be to suggest modifications in the law, either for the purpose of securing greater safety for the workmen, or of relieving the various industries from useless restrictions.

They could also do much to improve civil and mining engineering, by reporting the various improvements adopted in different parts of the Old and New World in some periodical similar to the *Annales des Mines*. There should be some provision in the law to prevent persons who have not properly learned their trade from being received in the mines as miners, firemen, or machinists. In this country there is no such regulation, and incompetent workmen are often put in charge of machines or employed to do work, which they do not understand. This is a frequent cause of disaster.

The ideas which I have wished to express in the foregoing pages may be summed up as follows:—

In the first place, a mining code should form but a portion of a general system of legislation for the better protection of the workmen employed in the various branches of industry. In framing such an act, the advice of able legal and scientific experts should be taken, and all parties whose lives or property are to be affected by it should be consulted, or at least afforded an opportunity of being heard.

No matter how perfect the law may be when passed, it will need constant modification as improvements are made in the different industries. It would also be necessary to have a corps of well-educated experts of several grades to superintend the execution of the law. Proper schools should be

provided for their education, and they should be promoted from one grade to another for merit alone. I would also insist upon the importance of establishing schools for master miners, in which any one who works in the mines could, while supporting himself by his labor, receive sufficient instruction in his business to qualify him to direct intelligently the underground workings of a mine. I think it very advisable to instruct the pupils of the common schools of the mining districts in the general principles of what the French call the "*hygiène des mineurs*," so that they may understand the dangers to which they will hereafter be exposed, and be able to afford relief to any one who has met with an accident. In this way all those engaged in and about the mines would be able to understand the provisions of the law and to aid in carrying them out intelligently. I would also again insist upon the importance of preventing the employment of ignorant or incompetent workmen in places where their want of skill may be the cause of disaster.

ECKLEY B. COXE.

Drifton, Jeddo P. O., Pa.